

## CLAIMS

1. A catalyst-supporting fiber structure having a catalyst supported on a fiber constituting a fiber structure, which is characterized in that the fiber has an average fiber diameter of not more than 1  $\mu\text{m}$  and that a fiber having a fiber length of not more than 20  $\mu\text{m}$  is not substantially contained.
2. The catalyst-supporting fiber structure according to claim 1, wherein the catalyst is made of an inorganic compound.
3. The catalyst-supporting fiber structure according to claim 1, wherein the catalyst is a photocatalyst.
4. The catalyst-supporting fiber structure according to claim 3, wherein the photocatalyst is one in which at least a part of the surface thereof is covered by other inorganic compound.
5. The catalyst-supporting fiber structure according to claim 1, wherein the catalyst is supported in a state that the catalyst adheres on the surface of the fiber.
6. The catalyst-supporting fiber structure according to claim 1, wherein the catalyst is supported in a state that the catalyst is contained inside the fiber, a part of which is contained such that it is exposed on the surface of the fiber.
7. The catalyst-supporting fiber structure according to claim 1, wherein the catalyst is supported in a state that the catalyst is a particle having a particle size in the range of

from 1 to 100  $\mu\text{m}$ , the particle is included in the fiber structure, and a non-contact portion between the catalyst particle and the fiber is present on the surface of the included catalyst particle.

8. The catalyst-supporting fiber structure according to claim 7, wherein the inclusion is effected by the matter that the catalyst particle comes into contact with one or plural fibers on the surface thereof.

9. The catalyst-supporting fiber structure according to claim 7, wherein the catalyst has a primary particle size of from 1 to 100  $\mu\text{m}$ .

10. The catalyst-supporting fiber structure according to claim 1, wherein the fiber is made of an organic polymer.

11. The catalyst-supporting fiber structure according to claim 10, wherein the fiber is made of polyacrylonitrile or a compound resulting from a thermal treatment of polyacrylonitrile.

12. The catalyst-supporting fiber structure according to claim 10, wherein the fiber is made of a halogen atom-containing organic polymer.

13. The catalyst-supporting fiber structure according to claim 12, wherein the halogen atom-containing organic polymer is poly(vinyl chloride).

14. The catalyst-supporting fiber structure according to claim 10, wherein the fiber is made of poly(lactic acid).

15. A production process of a catalyst-supporting fiber structure, which includes a step for dissolving a fiber-forming organic polymer to produce a solution; a step for spinning the solution by the electrospinning method; a step for obtaining a fiber structure as accumulated on a collecting substrate by the spinning; and a step for supporting a catalyst on the fiber structure.

16. The production process according to claim 15, wherein a solvent to be used for the dissolution is a volatile organic solvent.

17. The production process according to claim 15, wherein the supporting of a catalyst is carried out by dipping the fiber structure in a catalyst-containing liquid.

18. The production process according to claim 15, wherein the supporting of a catalyst is carried out by coating a catalyst-containing liquid on the surface of the fiber structure.

19. A production process of a catalyst-supporting fiber structure, which includes a step for dissolving a fiber-forming organic polymer and a catalyst precursor in a solvent to produce a solution; a step for spinning the solution by the electrospinning method; a step for obtaining a fiber structure as accumulated on a collecting substrate by the spinning; and a step for treating the catalyst precursor contained in the fiber structure to form a catalyst.

20. The production process according to claim 19, wherein

the solvent to be used for the dissolution is a volatile organic solvent.

21. The production process according to claim 19, wherein the method for treating the catalyst precursor is a hydrothermal treatment.

22. A production process of a catalyst-supporting fiber structure, which includes a step for dissolving a fiber-forming compound in a solvent and further dispersing a catalyst particle in the solution to produce a dispersion solution; a step for spinning the dispersion solution by the electrospinning method; and a step for obtaining a catalyst-supporting fiber structure as accumulated on a collecting substrate by the spinning.

23. The fiber structure according to claim 22, wherein the catalyst particle is a particle having a particle size in the range of from 1 to 100  $\mu\text{m}$ .

24. The catalyst-supporting fiber structure according to claim 23, wherein the catalyst has a primary particle size of from 1 to 100  $\mu\text{m}$ .

25. The production process according to claim 22, wherein the solvent to be used for the dissolution is a volatile organic solvent.